

# Developing Value-Added Chestnut Products to Increase Grower Profits

A Final Report on the Research Conducted for:



## **Federal State Marketing Improvement Program**

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Midwest Nut Producers Council  
and  
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## Introduction

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This report will serve to as the final report of progress of research for, “Developing Value Added Products to Increase Grower Profits”.

Objectives and goals were met in a timely manner, within the budget specified. Researchers milled chestnut flour and produced crumbles and puree for use in value-added products. Professional chefs were enlisted to develop product concepts (recipes) and provide feedback on components and recipes. Chefs evaluated chestnut purees, crumbles, and flour. Researchers identified six chestnut soup recipes which were evaluated in thermal testing and used in preliminary consumer evaluation. One recipe for soup was taken to a commercial producer for large batch preparation. This soup is in the final phase of testing by consumers. Researchers also conducted a national study via the Internet, drawing a sample that was representative of the U.S. population on average and over-sampled persons of Mediterranean, Hispanic, Asian, and African descent.

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## Goals and Objectives of the Project

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The goal of the project was to develop more value-added chestnut products for the MNPC to test market to culinary professionals and consumers. To facilitate this development, the following objective questions were researched:

- 1) *How can we take peeled chestnuts from the peeler add more value to them?* This will be accomplished through food product development, which includes developing formulas, using input from previous work with Michigan chefs, and data obtained from the thermal processing studies.
- 2) *How will professionals rate the characteristics for chestnut puree and crumbles in dishes they prepare?* Michigan chefs will provide valuable feedback on the puree and crumbles they incorporate in their recipes.
- 3) *How would different segments of American consumers buy and use the value-added chestnuts?* This will be accomplished through the tasting of the chestnut products on the campus of Michigan State University and feedback from customers at specialty/gourmet shops.

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## What have been the most challenging aspects of this project?

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### Soup Development

Initial efforts in chestnut soup development project involved the screening of potential gourmet soup recipes for further development. Substitution of chestnut flour and addition of chestnut pieces were performed on the selected recipes. These recipes include a variety of creamy and broth soups such as Cream of Chestnut, Harvest Time, and Chestnut Celery Soup. The informal sensory feedback of this batch of soups required modification and a new strategy.

In this approach, a soup base formulation was created from the Cream of Chestnut Soup recipe contributed by Higgins during the Chestnut cook-off by a student with Culinary Arts experience. Once the lightly flavored base was formed, the addition of other ingredients was added to produce the final formulation. The formulation effort involved the adjustments and modification of ingredients to achieve the desired flavor, texture and aroma. Five soups were developed from this effort and as follows: Wild Rice Mushroom Soup, Chestnut Bisque, Soy Corn with Tarragon Soup, Mulligatawny and Adobo Hominy Soup was developed. The first three were creamy while the last two were broth-like. After informal soup evaluations among researchers including Drs. Janice Harte, Bridget Behe, Dennis Fulbright and Kirk Dolan, three soups were selected based on overall acceptability for further formulation; Wild Rice Mushroom Soup, Adobo Hominy Soup and Soy Corn with Tarragon Soup.

The Wild Rice Mushroom Soup has a creamy texture but with the addition of mushroom, wild rice, chestnut pieces, with a tinge of sherry. This recipe can be either meat or vegetarian simply by substituting the base paste. The Adobo Hominy soup is a broth soup with chopped vegetables, shredded chicken pieces and chestnut pieces with the Mexican spice touch. The Soy Corn with Tarragon Soup is a creamy soy based soup with the complimentary texture of corn pieces and tarragon flavor spice. All soups were developed using grocery items and only the Wild Rice Mushroom Soup formulation has been successfully converted to commercial food ingredients.

### **Processing**

As part of scale up processing, Onion Crock Company, Grand Rapids was contracted to produce 20 gallons of the Wild Rice Mushroom Soup for Autumnfest, an annual event on the campus of Michigan State University, in 2003. This required 5 lbs of chestnut flour and pieces. The original formulation developed by Michigan State University along with the list of suppliers used was provided to the company representatives. The trial batch of soup made was informally evaluated by the research group. It was observed that the sensory characteristics of the final product did not match completely with the original MSU recipe due to different ingredient suppliers and slight modifications. However, this final product received positive responses from the research group and was accepted in the production. The soup was reported to be a success in the Autumnfest event.

### **Thermal Processing Tests**

Thermal processing data on the chestnut soups for safety and preservation purposes have been started by initial soup canning studies. The MSU commercial version of Mushroom Wild Rice Soup was cooked on the stove in 1100 Food Experimental Lab, Anthony Hall and hot filled immediately into a regular pint jars (Ball) and sealed. The jars were pressure-cooked according to manufacturer's instructions in duplicates at 10 psi using Mirro pressure cooker. The ideal cooking time is approximately 1 hour. In this study, the soups were cooked longer than usual in a real-life processing condition to (4-5 hours more) to evaluate the performance of the formulation after excessively over processing. Informal sensory evaluations of the final cooled product graded the texture and flavor of the soups as acceptable.

The soups will be thermally processing in a retort pressure cooker in the MSU pilot plant under the leadership of Dr. Kirk Dolan. Measurements such as temperature and pressure will be taken and the quality of the final processed product will be evaluated.

## Market Studies

Studies to evaluate a vegetarian based chestnut soup in winter 2003 at Specialty Stores were postponed due to a management decision in the specialty stores. As a substitute, researchers are in the process of evaluating the soup on a large scale both on the campus of Michigan State University and at the Chestnut Festival in Cadillac, Michigan. Both studies are scheduled for October 16, 2004. Respondents will be given a survey to complete on-site. Results will be analyzed using a statistical program (Statistical Package for Social Sciences). Onion Crock Company was contracted to produce soup for the taste panels.

Furthermore, eight chefs were given 4lbs of chestnut flour to evaluate its properties and usability in baking. Pastry chefs and gourmet chefs with baking experience have been invited to participate from Pastry Schools, Culinary Programs, and fine dining establishments. They provided feedback on the flour via a survey. Survey questions asked chefs about flour consistency, storage, and possible application limitations. Recipes generated by the evaluation were given to the research team to help understand the applications of chestnut flour and also discover new uses for the product. Researchers evaluated the Chef's data in April 2004. Select quotes from the study are as follows:

"...I believe the cake was a better application because it seemed more like a heartier cake rather than with the tart which you would still expect it to be more delicate." *Chef, The French Pastry School Chef*

"Probably the best application was for making pancakes. We found the cakes to be very flavorful and sweet. They are similar to buckwheat pancakes, but in my opinion much better tasting. I believe this recipe was a true winner." *Chef/Instructor, Hospitality Program Grand Rapids Community College*

Finally, there have been some informal opportunities to gauge a market response to value added chestnut products. As mentioned earlier, during Autumnfest, researchers gave out samples of a vegetarian chestnut soup and chestnut brownies (made from recipes generated from past chef studies). Developers received instant feedback from the tasters, which allowed the team to further refine flour and soup recipes.

In September, 2004, Knowledge Networks worked with researchers to conduct a national study, with 1610 participants representative of the U.S. on average, to determine their chestnut purchase and consumption. Several groups were over-sampled, to gain a greater representation of their past chestnut purchase and use. Persons of Asian and Hispanic descent were more likely to have eaten chestnuts in the past year than Caucasian or Black Americans. Twenty-five percent of the Asian Americans had eaten fresh roasted chestnuts in the prior year, compared to 8% of Hispanic Americans and only 6% of Caucasian and Black Americans (see Figure 1). A substantially higher percentage of Asian Americans expressed a size preference for the nuts (Figure 2).

Nearly half of the Asian Americans expressed a nut-size preference (compared to only 11%-13% of Hispanics, Caucasians, and Blacks). Fifteen percent of the Asian Americans preferred a larger nut (10% preferred a smaller nut and 15% indicated they preferred neither size over the other, with 10% not responding to the question). A higher percentage of Asian Americans reported it was “very easy” to find fresh chestnuts, compared to the other ethnic groups. Thirty-nine percent of the Asian-Americans had someone in their household eat fresh chestnuts in the year prior to the survey (compared to less than 11% of Blacks, Caucasians, and Hispanics).

Figure 1. Percentage of each group that had eaten this form of chestnuts

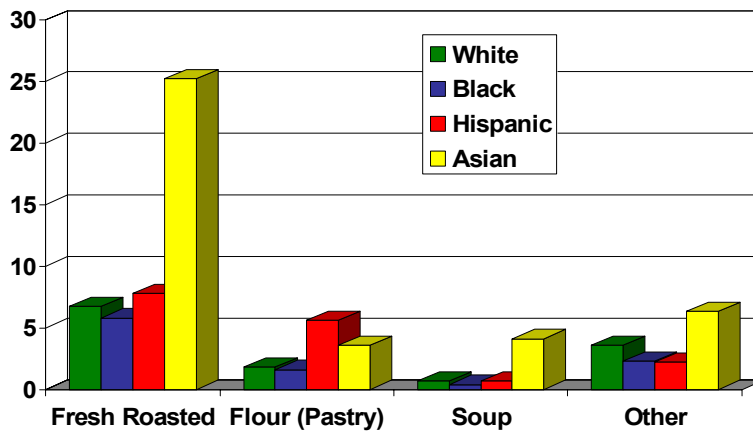
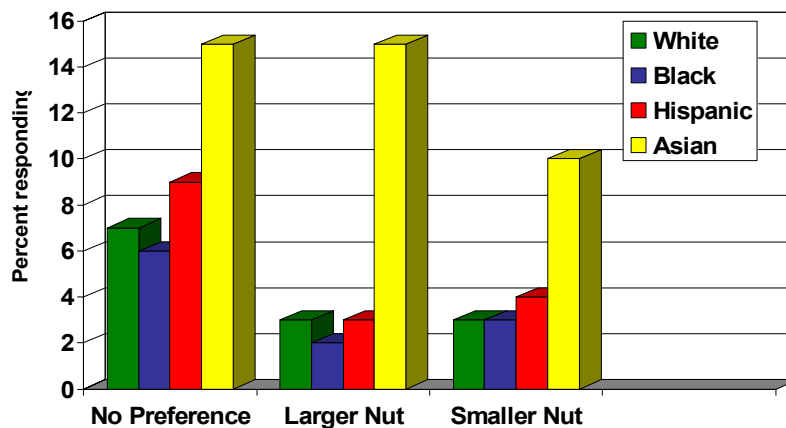


Figure 2. Nut size preferences.



**2) What advice you would give to other organizations planning a similar program. These should include strengths and limitations of the program. If you have the opportunity, what would you have done differently?**

Retail stores were reluctant to participate because the product is not commercially available. Development of soup recipes was, relatively speaking, easy to do. Evaluation among researchers was a speedy way to eliminate recipes that were too different, and narrow choices that a range of consumers might enjoy. Ramping up production proved to be another challenge. We had to mill our own chestnut flour and make chestnut pieces to create the large batches for testing. There are no mills available in a size between small bench-top models and large commercial mills.

Although an excellent resource, professional chefs are, at times, a challenging group with whom to work. They are so pressed for time that it was difficult to schedule times to talk with them to even get product delivered to them. Debriefing them proved to be another challenge.

This type of work was well-suited for a research study as it proved to be a significant investment of time and money to develop a viable new product. Significant strides have been made in the development of the chestnut soups and flour. The information gathered in market testing will be pivotal for the next steps of the project. Informal testing at Autumnfest leads researchers to believe that the soup and chestnut flour products may both be acceptable and feasible for future value added products. However a formal large scale market study should be completed to confirm the group's hypothesis. If the hypothesis is confirmed, researchers would like to approach bakery mix manufacturers to gauge the interest level of including chestnut flour in their applications. Furthermore, restaurants, gourmet cooks, and soup manufacturers could also be approached to incorporate chestnut soup into their menu and product lines.

**3) If an innovative approach was used successfully, the grantee should describe their program in detail so that other organizations might consider replication of their areas.**

Our work with professional chefs we believe to be an innovative one. We have worked with them in the past with other research projects (involving tart cherries and whole chestnuts) and have found them to be creative allies in the product development process. Challenges in working with this group were noted above.

**4) A comparison of actual accomplishments to the objectives of the grant period.**

a) *How can we take peeled chestnuts from the peeler add more value to them?* This was accomplished through food product development (chestnut flour into brownies, flour and crumbles into soups), which included developing formulas, using input from previous work with Michigan chefs, and data obtained from the thermal processing studies.

b) *How will professionals rate the characteristics for chestnut puree and crumbles in dishes they prepare?* Michigan chefs provided valuable feedback on the puree and crumbles they incorporate in their recipes. We obtained their recipes and tested some further (brownies and soup). We gained insight into the use of flour beyond baking as it made the soup thicker. Our work with the chefs enlightened them with regard to the many uses of fresh chestnuts.

c) *How would different segments of American consumers buy and use the value-added chestnuts?* This was accomplished through the tasting of the chestnut products on the campus of Michigan State University and feedback from customers at specialty/gourmet shops. We also conducted a national survey via the Internet using a sample representative of the U.S. on average to ascertain their purchase and consumption of chestnuts.

#### **5) Reasons why established objectives were not met, if applicable.**

Final consumer evaluation of the final soup recipe will be tested in October, 2004. We overestimated the ease with which the soups could be commercially processed (as we provided the raw ingredients). As noted above, the flour and pieces needed to be milled in small batches. The other great challenge was that retail operations were reluctant to taste-test or evaluate product that was not commercially available. We sought alternative locations to taste-test the final soup recipe.

#### **6) Reasons for any problems, delays, or adverse conditions which will affect attainment of overall program objectives prevent meeting time schedules or objectives, or preclude the attainment of particular objectives during established time periods. This disclosure shall be accomplished by a statement of the action taken or planned to resolve the situation.**

Overall, objectives and goals were met. Final tasting and evaluation of the selected soup recipe is scheduled for October, 2004. Challenges in producing sufficient quantities of soup for evaluation (product availability issues) as well as scheduling challenges listed above delayed the final evaluation until this month. On October 17, 2004, evaluations are scheduled to be conducted at the Chestnut Festival in Cadillac, Michigan, and at the homecoming celebrations on the campus of Michigan State University. Approximately 150 adult participants will be recruited at each event for soup evaluation. If insufficient numbers are recruited, an alternative (or additional) evaluation will be held at Autumnfest on the Michigan State University Campus. With this minor aspect of the project scheduled for completion soon, the project was an overall success.

#### **7) Objectives and timetables established for the report period.**

Objectives were met and reports were made in a timely manner. The objectives were accomplished within the budget and nearly within the time-frame outlined in the proposal (see item 4 above).